Spring 1-1-2020

ECET 344-002: Numerical Computing for Engineering Technology

Mohammad Rabie

New Jersey Institute of Technology
University Heights
Newark, NJ 07102-1982

Department of Engineering Technology
GITC Building Suite 2100
Phone: 973.596.3228
Fax: 973.624.4184
Email: EngineeringTechnology@njit.edu

NEWARK COLLEGE OF ENGINEERING

TENTATIVE* SYLLABUS AND COURSE INFORMATION, SPRING 2020*

Course Name: Numerical Computing for Engineering Technology

Course Number: ECET 344

Course Structure: 2-2-3 (lecture hr/wk – lab hr/wk – course credits)

Course Description: An introduction to the use of a computer to analyze and solve problems common in engineering. Using computers and the application language students will confront a variety of tasks that will promote an object oriented programming structure. The goal of this course is to understand and program routines commonly used in the design of computer algorithms for computer-based problems. Practical applications as well as mathematical programming are stressed.

Prerequisites: (CS 100 or CS 101 or CS 106 or CS 115) and (Math 238 or Math 112)

Co-requisites: Math 309

Required, Elective, or Selected Elective: Required

Required Materials: **Text:** Name: Problem Solving with C++
Author: Walter Savitch
Year: 2014
ISBN: 978-0-13-386221-8

Course Learning Outcomes: By the end of the course students are able to:

1. Understand programming constructs and develop programs based on data types, program control, and data structures.
2. Apply classes and numerical analysis techniques to solve programming problems.
3. Develop classes with member functions
4. Understand, analyze, and develop object-oriented solutions to programming problems.
5. Develop solutions based on inheritance and templates.
6. Develop solutions based on standard template libraries.
7. Develop solutions that integrate numerical analysis techniques and object oriented design.
8. Develop file I/O solutions and understand basic data storage.
9. Communicate algorithms and issues related to programs in writing.
10. Write well-commented, maintainable code and documentation.

Class Topics:

Constructs	Data Types
Program Control	Data Structure
Classes	Objects
Libraries	Member Functions
Inheritance	Templates
Algorithms	I/O

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Student Outcomes:

The Course Learning Outcomes support achievement of the following Student Outcomes from the ETAC of ABET Criterion 3 requirements.

Student Outcome a: An ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly defined engineering technology activities.
Related Course Outcome: 3, 5, 6, 7, & 8

Student Outcome f: An ability to identify, analyze, and solve broadlydefined engineering technology problems. **Related Course Learning Outcomes:** 2

Student Outcome l: The application of circuit analysis and design, computer programming, associated software, analog and digital electronics, and microcomputers, and engineering standards to the building, testing, operation, and maintenance of electrical/electronic(s) systems.
Related Course Learning Outcomes: 3 & 10

Student Outcome m: The application of natural sciences and mathematics at or above the level of algebra and trigonometry to the building, testing, operation, and maintenance of electrical/electronic systems.
Related Course Learning Outcomes: 7

Academic Integrity:

NJIT has a zero-tolerance policy regarding cheating of any kind and student behavior that is disruptive to a learning environment. Any incidents will be immediately reported to the Dean of Students. Please visit the Dean of Students website at http://www.njit.edu/doss for a list of student policies relating to academic integrity and student conduct.

Modification to Course:

The Course Outline may be modified at the discretion of the instructor or in the event of extenuating circumstances. Students will be notified in class of any changes to the Course Outline.

Prepared By: Daniel Brateris

Course Coordinator: Daniel Brateris

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NEWARK COLLEGE OF ENGINEERING

COURSE	Monday 01:00 pm – 03:05 pm GITC 2308 (LEC)
MEETS	Monday 03:15 pm – 05:20 pm GITC 2308 (LAB)
COURSE BY	**Name**: Mohammad Rabie
	Office: GITC-2108
	Email: mrabie@njit.edu
	Phone: 973 – 596 – 5775
OFFICE HOURS	Wednesday 01:30 pm – 04:00 pm

STUDENT BEHAVIOR

- No eating or drinking is allowed at the lectures, recitations, workshops, and laboratories.
- Phones must be turned off during the class hours – if you are expecting an emergency call, leave it on vibrate.
- No headphones can be worn in class.
- Unless the professor allows the use during lecture, laptops should be closed during lectures.
- During laboratory, if you are finished earlier, you must show the professor your work before leaving class.
- Class time should be participative. You should try to be part of a discussion

LECTURE AND LAB SCHEDULE FOR ECET 344*

Week	Lab and Lecture	Chapters	Work Due
1	Introduction to Computers and Programming. The inception of C and C++, Programming style, Working with Visual Studio	Lab #1	
2	Building a program, developing menu structure, Implementing the Switch/Case, I/O routines, function for simple math.	Lab #2	Lab #1
3	Introduction of the Class and objects, building different classes.	Lab #3	Lab #2
4	An introduction to the random number generator, file stream, simple max min sort routines, storing variables in arrays (one dimensional). Creating file names and saving data to disk	Lab #4	Lab #3
5	Decision making, program structure, flow charting **TEST I**	Lab #5	Lab #4
6	Review material, lab catchup	Lab #6	Lab #5
8	Mathematical models, determinants	Lab #7	Lab #6
9	Software simulation, functions	Lab #8	Lab #7
10	Numerical Solutions, user input, Data Manipulating, 2D Arrays, Manipulating Arrays, Pointers **TEST II**	Lab #9	
11	Data Manipulating, 2D Arrays, Manipulating Arrays, Pointers		Lab #8
12	Creating data arrays, sorting array, Assenting, Descending	Lab #10	Lab #9
13	Creating data arrays, testing randomness, curve fitting data set Lab; Linear Regression Cont. **TEST III**		
14	Review semester material, lab catch up		Lab #10
15	**FINAL EXAM**	All work is due	

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GRADING POLICY

Attendance & Professionalism	5%
Homework	5%
Laboratory	20%
Quizzes	10
Tests	30%
Final Exam	30%

Note: Cannot pass course if you have failing grades on tests and final exam. There will be three exams during the semester. The lowest grade will be dropped.

SOFTWARE:
MS Visual Studio express (Each student will need to have access to a C++ compiler as outlined in the course material)

FORMAL LAB REQUIREMENTS
A formal lab is a written procedure that describes objectives, reasons, procedure and conclusions. The labs will require the student to submit a formal lab for full credit.

- Title Page (standard NJIT cover page)
- Objective – Describe what the requirements are in the laboratory exercise.
- Procedure – A description of what needs to be done to accomplish the objectives.
- Description – The process of the program, what structures, functions and algorithms you developed to solve the lab exercise. Possibly a flow chart, or formulas
- Results – Your results of running your program
- Conclusions – A description of meeting the procedures and success of the program
- Graphs or Data if required. Include Excel graphs and data if needed
- Source Code – Always include your source code

****Notes Regarding Laboratory Work:***

1. All Lab reports items must be typed in any handwritten portion of you Lab report will be penalized.
2. Only one report is required per group but a work distribution sheet must be handed in with the report with a different member of the team writing each part.
3. All lab reports are due at the beginning of the Lab class one week after the lab session.
4. Ten percentage points will be deducted for each week the report is late. Lab reports will not be graded if late for more than 2 weeks.

**** The instructor reserves the right to amend this schedule depending on dynamics of the class and the progress throughout the semester.**